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(54) Electrical plug and socket connector

(57) An electrical connector has male 12 and female 10 parts engageable by longitudinal movement of one towards the other, and latching means for locking the male part within the female part. The latching means comprise four transversely sprung fingers 21 on the female part with camming surfaces 23 which are displaced by longitudinal movement of the male part and which spring back to lock behind a collar 37. The male part has a longitudinally movable sleeve 40 allowing withdrawal of the male part using a gripping portion 30. Insertion and withdrawal of the male part 12 may operate switch contacts 18.

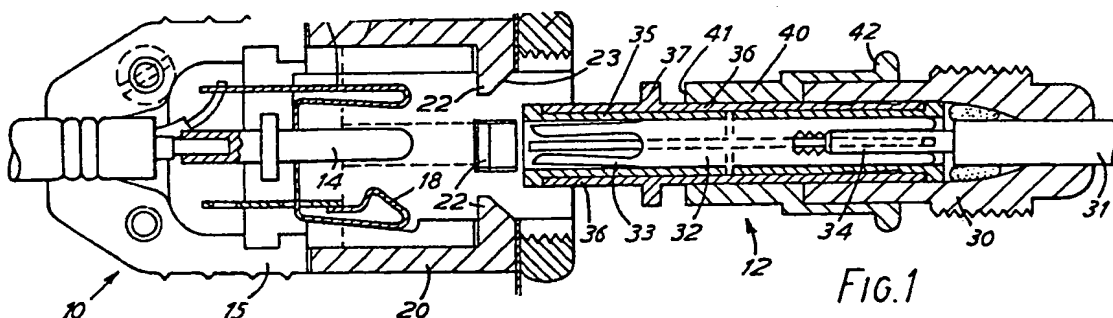
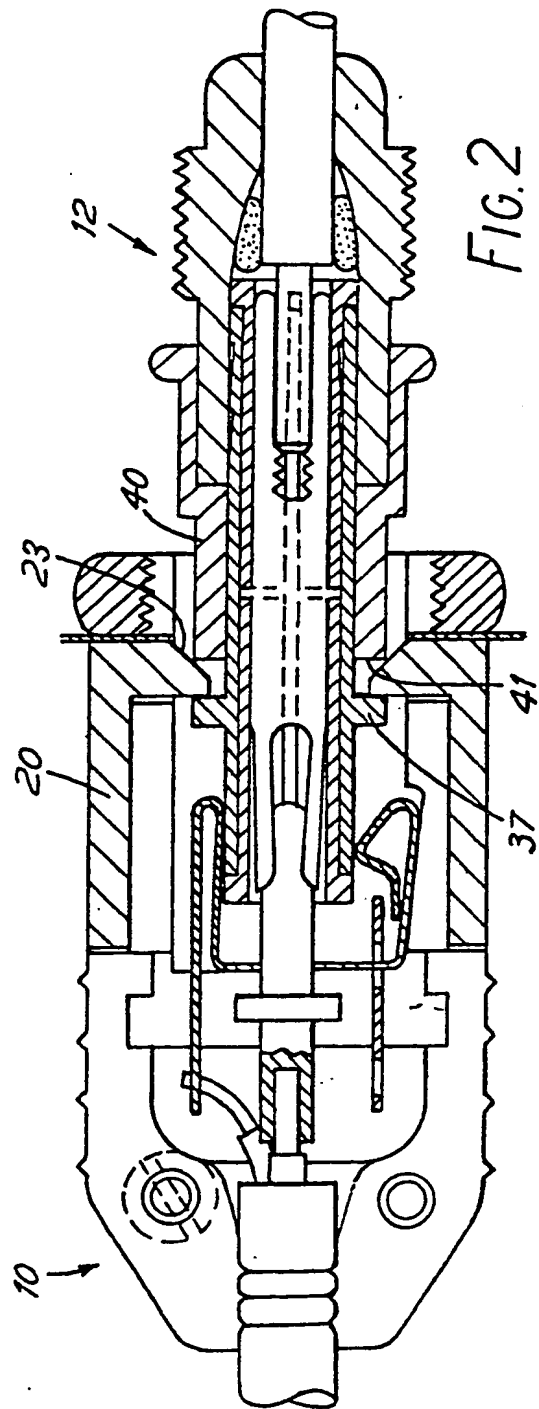
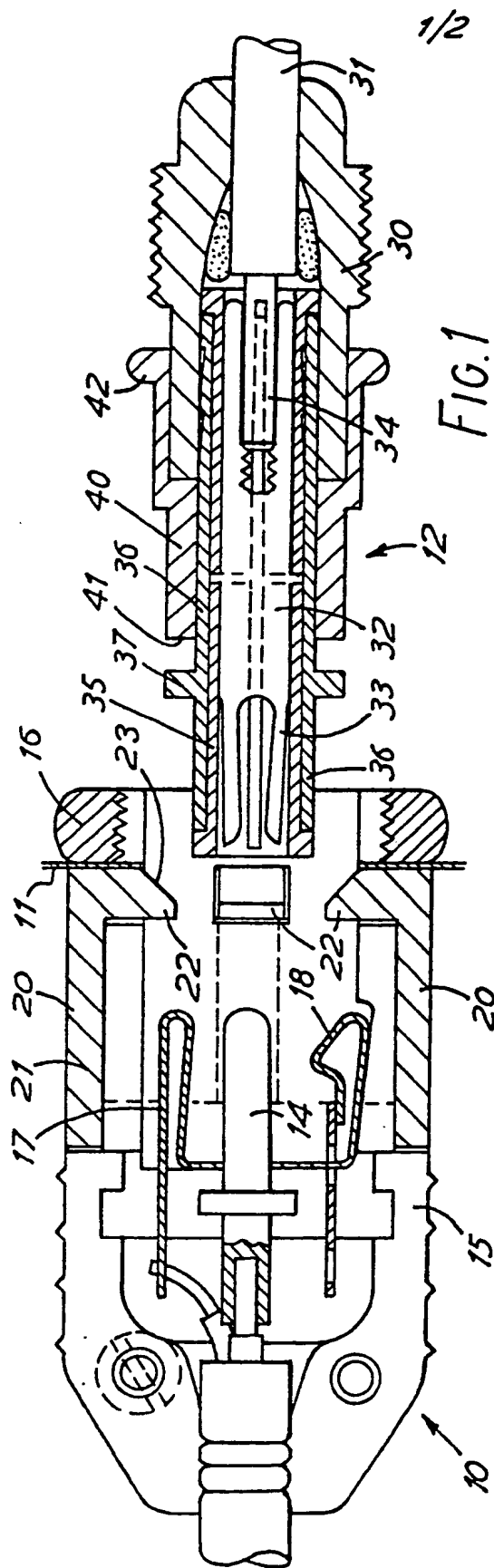


FIG. 1

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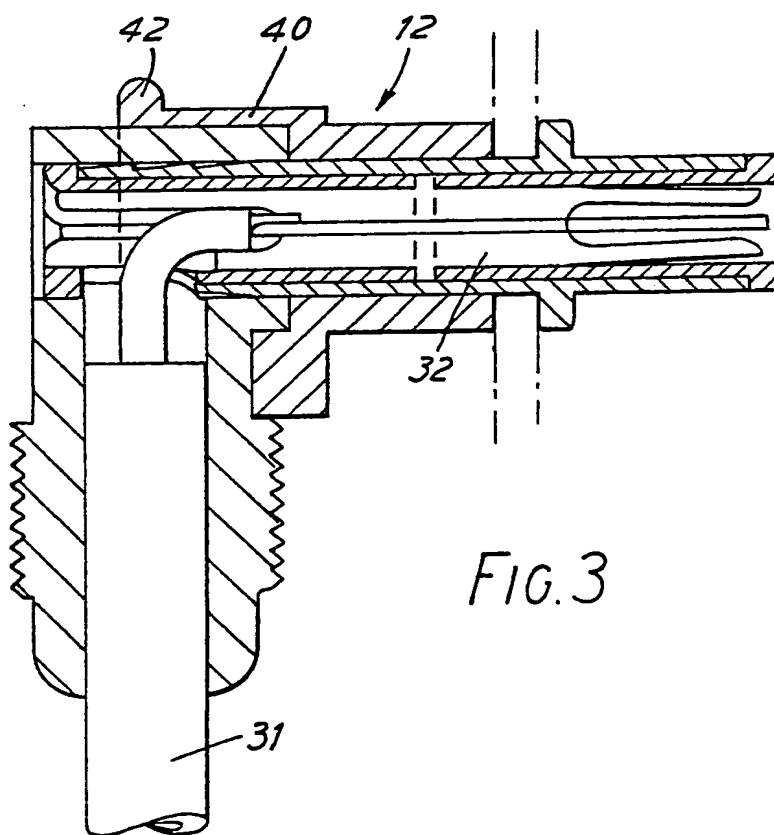


FIG. 3

Electrical Plug and Socket Connector

This invention relates to an electrical plug and socket connector, in particular a low voltage connector.

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Although the invention is not restricted to connectors of this type, there are in use many low voltage (i.e. 12 volts) connectors used for electrical equipment which have two poles in a concentric or co-axial arrangement. These connectors are sometimes referred to as a Jack Plug and Socket under the designation PP90. Unfortunately, these connectors in particular, may easily become detached with loss of power to the equipment served. It would be a considerable advantage to provide locking or latching of the two parts of the connector, and such a provision may be of advantage with other connectors than the specific one mentioned above.

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According to a first aspect of the invention there is provided an electrical plug and socket connector, having male and female parts engageable by longitudinal movement of one towards the other, and latching means for locking the male part within the female part, the latching means comprising a transversely sprung member on the female part with a camming surface, which member is displaced by said longitudinal movement of the male part and which springs back to lock the latter in engagement, wherein the male part has a longitudinally movable release means which acts on the camming surface to displace the sprung member allowing withdrawal of the male part.

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As the release means are mounted on the male part of the connector the female part can be mounted on a suitable surface such as a panel.

Preferably, the release means is in the form of a longitudinally slidable sleeve which, when pushed along the male part towards the sprung member, pushes the sprung member outwards, allowing the male part to be withdrawn.

According to a second aspect of the invention there is provided an electrical plug and socket connector having a switch therein, said connector comprising male and female parts engageable by longitudinal movement of one towards the other, and wherein engagement of the two parts operates said switch.

The switch may be used to disconnect an internal battery which supplies power to the female part when it is not connected to an external power source via the male part.

In order that the invention shall be clearly understood, an exemplary embodiment thereof will now be described with reference to the accompanying drawings, in which:

Figure 1 shows the first and second parts of a co-axial connector about to be engaged with one another;

Figure 2 shows them locked in engagement; and

Figure 3 shows a right-angle version of the second part.

In Figure 1, the first part 10 of the connector is surface mounted in a wall 11 of a piece of electrical equipment. The second part 12 of the connector is fixed at the end of a supply lead. Both parts of the connector are cylindrical and are connected at the end of concentric twin cables.

The first part 10 of the connector (female) has a central connector pin 14, and is held in the wall of the electrical appliance by a threaded collar 16. The second electrical terminal is formed by a spring member 17, which also incorporates a switch 18 which may be used, for example, to disconnect an internal battery when an external supply via part 12 is connected. The switch 18 is of conventional design.

The part 10 incorporates latching means in the form of four equally spaced sprung members 20 in the form of a finger 21 with an inwardly directed latching head 22 each head has an oblique camming surface 23.

The second connector part (male) 12 has a number of concentric sleeves mounted on a gripping member 30. The latter is externally ribbed and admits the concentric twin cable 31 through an axial bore. Projecting from the bore at its other end are a metallic socket 32 with a series of spring fingers 33, the socket making intimate contact with the centre conductor 34 of the cable 31. Surrounding the socket member 32 is an insulating sleeve 35 and surrounding that again a metallic sleeve 36 which forms the second terminal of the male connector and which is connected within the gripping member 30 to the outer conductor of the cable 31. The metallic sleeve 36 has a circumferential collar 37 which forms part of the latching means.

Finally, surrounding the metallic sleeve 36 is a slidable release sleeve 40, the forward end 41 of which can contact the collar 37 or can be slid back by a small distance, e.g. 2 - 4 mms by means of a finger collar 42.

It can be seen that when the second part 12 is moved towards the first part 10, the metallic socket member 32 will come to engage around the centre pin 14 and the spring member 17 will simultaneously make contact with the metallic sleeve 36, thus setting up the two electrical connections. Moreover, the final movement will bring the collar 37 to bear against the camming surfaces 23, so that the fingers 21 are deflected outwards to allow the collar to pass. Once that has happened, the latching heads 22 will again move inwards to engage behind the collar 37, between the latter and the forward end 41 of the release sleeve 40. In the engaged position, the two connector parts will appear as in Figure 2.

In order to release the second part, pressure is applied by means of finger collar 42 to the release sleeve 40 to move it towards the first connector part. The forward end 41 of the sleeve 40 will bear against the camming surfaces 23, thus pushing the fingers 21 outwards and allowing the end 41 to abut the collar 37. With the release sleeve held in that position, it is then possible to pull on the gripping member 30 to withdraw the second connector part completely from engagement with the first.

Such an electrical plug and socket connector is easy to engage but impossible to disengage without specific action by a user. Thus, inadvertent disconnection of the plug and socket is not possible. Moreover, plugs and sockets of this new design are compatible respectively with the sockets and plugs of the former design which do not include such latching means. There is thus no problem in using supply leads and sockets interchangeably with old and new equipment.

Figure 3 shows an arrangement in which the male connector part has the electrical lead emerging at right angles. The mechanism is effectively identical for providing the locking and unlocking of the connection. The finger collar 42 is horseshoe shaped since it cannot extend right around the plug part 12.

The invention is not restricted to plug and socket connectors of the co-axial type, since similar latching means may be provided where there are two or more electrical contact pins arranged side by side.

Moreover, the invention may be applied to an inline cable connection. Part 10 is then not mounted in a wall of an apparatus, but does incorporate a cable clamp to secure the cable from being pulled out.

The switch 18 incorporated in the connector may be arranged so that it closes when the male and female parts are engaged. The switch can be used to supply power to the connector after engagement of the parts and eliminates the need for an external power switch.

Claims

1. An electrical plug and socket connector, having male and female parts engageable by longitudinal movement of one towards the other, and latching means for locking the male part within the female part, the latching means comprising a transversely sprung member on the female part with a camming surface, which member is displaced by said longitudinal movement of the male part and which springs back to lock the latter in engagement, wherein the male part has a longitudinally movable release means which acts on the camming surface to displace the sprung member allowing withdrawal of the male part.

2. A connector according to Claim 1 wherein the release means is in the form of a longitudinally slidable sleeve which, when pushed along the male part towards the sprung member, pushes the sprung member outwards, allowing the male part to be withdrawn.

3. A connector according to Claim 1 or 2, wherein the male part is substantially cylindrical.

4. A connector according to any preceding Claim, wherein the male part further comprises a flange-like member extending radially from the main body of the male part, said member acting on said camming surface during connection to displace the sprung member.

5. A connector according to Claim 4, wherein the flange-like member acts as a keyed surface to allow the sprung member to lock on to the male part during engagement.

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6. A connector according to any preceding Claim, wherein an electrical connection is made between one or more outwards extending pins incorporated in the female part and one or more spring members incorporated in the male part, said spring members being configured to receive said pin or pins.

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7. A connector according to Claim 6, wherein appended to Claim 3, wherein there is a single outward extending pin and a single spring member, both coaxial with the male part.

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8. A connector according to any preceding Claim wherein the female part further comprises fixing means to secure said female part to a surface.

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9. A connector according to Claim 8, wherein the fixing means comprises a threaded collar around the female part.

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10. A connector according to any preceding Claim further comprising clamping means to hold an electrical cable within the female part.

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11. A connector according to any preceding claim wherein the connector contains a switch which is operated by the engagement of the male part with the female part.

12. An electrical plug and socket connector having a switch therein, said connector comprising male and female parts engageable by longitudinal movement of one towards the other, and wherein engagement of the two parts operates said switch.

13. A connector substantially as described herein with reference to, or as illustrated in the drawings.

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